

WHAT IS CLAIMED IS:

1. A Fischer-Tropsch catalyst for the conversion of synthesis gas into Fischer-Tropsch products, the catalyst comprising:
  - 5 a structured catalyst support;
  - an active metal for promoting a Fischer-Tropsch reaction disposed on the catalyst support; and
  - wherein the support has a voidage ratio greater than 0.6.
- 10 2. The catalyst of Claim 1 wherein the catalyst support has a linear dimension of at least 200 microns.
3. The catalyst of Claim 1 wherein the catalyst support has a linear dimension of at least 500
- 15 microns.
4. The catalyst of Claim 1 wherein the catalyst support has a linear dimension of at least 700 microns.
5. The catalyst of Claim 1 wherein the catalyst support has a linear dimension of at least one
- 20 inch.
6. The catalyst of Claim 1 wherein the Fischer-Tropsch catalyst has a catalyst concentration for a given volume of at least 10 percent.
- 25 7. The catalyst of Claim 1 wherein the catalyst support is formed with a mean L/D less than 20.
8. The catalyst of Claim 1 wherein the catalyst is operable to produce a productivity in the range of 200 - 4000 vol CO/vol. catalyst/hour or greater
- 30 over at least a 600 hour run of a Fischer-Tropsch reactor with the catalyst therein.

9. A Fischer-Tropsch catalyst system for the conversion of synthesis gas into Fischer-Tropsch products, the catalyst system comprising a Fischer-Tropsch catalyst with a voidage ratio greater than or equal to 0.45 and a catalyst concentration for a given volume of at least 10 percent.

Year	Total population		Male population		Female population		Total population		Male population		Female population	
	Population	Density	Population	Density	Population	Density	Population	Density	Population	Density	Population	Density
1950	1,000,000	100	500,000	50	500,000	50	1,000,000	100	500,000	50	500,000	50
1955	1,100,000	110	550,000	55	550,000	55	1,100,000	110	550,000	55	550,000	55
1960	1,200,000	120	600,000	60	600,000	60	1,200,000	120	600,000	60	600,000	60
1965	1,300,000	130	650,000	65	650,000	65	1,300,000	130	650,000	65	650,000	65
1970	1,400,000	140	700,000	70	700,000	70	1,400,000	140	700,000	70	700,000	70
1975	1,500,000	150	750,000	75	750,000	75	1,500,000	150	750,000	75	750,000	75
1980	1,600,000	160	800,000	80	800,000	80	1,600,000	160	800,000	80	800,000	80
1985	1,700,000	170	850,000	85	850,000	85	1,700,000	170	850,000	85	850,000	85
1990	1,800,000	180	900,000	90	900,000	90	1,800,000	180	900,000	90	900,000	90
1995	1,900,000	190	950,000	95	950,000	95	1,900,000	190	950,000	95	950,000	95
2000	2,000,000	200	1,000,000	100	1,000,000	100	2,000,000	200	1,000,000	100	1,000,000	100
2005	2,100,000	210	1,050,000	105	1,050,000	105	2,100,000	210	1,050,000	105	1,050,000	105
2010	2,200,000	220	1,100,000	110	1,100,000	110	2,200,000	220	1,100,000	110	1,100,000	110
2015	2,300,000	230	1,150,000	115	1,150,000	115	2,300,000	230	1,150,000	115	1,150,000	115
2020	2,400,000	240	1,200,000	120	1,200,000	120	2,400,000	240	1,200,000	120	1,200,000	120
2025	2,500,000	250	1,250,000	125	1,250,000	125	2,500,000	250	1,250,000	125	1,250,000	125
2030	2,600,000	260	1,300,000	130	1,300,000	130	2,600,000	260	1,300,000	130	1,300,000	130
2035	2,700,000	270	1,350,000	135	1,350,000	135	2,700,000	270	1,350,000	135	1,350,000	135
2040	2,800,000	280	1,400,000	140	1,400,000	140	2,800,000	280	1,400,000	140	1,400,000	140
2045	2,900,000	290	1,450,000	145	1,450,000	145	2,900,000	290	1,450,000	145	1,450,000	145
2050	3,000,000	300	1,500,000	150	1,500,000	150	3,000,000	300	1,500,000	150	1,500,000	150
2055	3,100,000	310	1,550,000	155	1,550,000	155	3,100,000	310	1,550,000	155	1,550,000	155
2060	3,200,000	320	1,600,000	160	1,600,000	160	3,200,000	320	1,600,000	160	1,600,000	160
2065	3,300,000	330	1,650,000	165	1,650,000	165	3,300,000	330	1,650,000	165	1,650,000	165
2070	3,400,000	340	1,700,000	170	1,700,000	170	3,400,000	340	1,700,000	170	1,700,000	170

10. A method of preparing a Fischer-Tropsch catalyst  
for use in converting synthesis gas into Fischer-  
Tropsch products, the method comprising the steps  
of:

providing a structured catalyst support  
having a voidage ratio greater than 0.6; and  
applying an active metal for promoting a  
Fischer-Tropsch reaction to the catalyst  
support.

11. The method of Claim 10 wherein the step of  
providing a catalyst support comprises providing a  
catalyst support having a mean L/D ratio of less  
than 10.

12. The method of Claim 10 wherein the step of  
providing a catalyst support comprises providing a  
catalyst support having at least one linear  
dimension greater than 200 microns.

13. The method of Claim 10 wherein the step of  
providing a catalyst support comprises providing a  
catalyst support having at least one linear  
dimension greater than 500 microns.

14. The method of Claim 10 wherein the step of  
providing a catalyst support comprises providing a  
catalyst support having at least one linear  
dimension greater than 700 microns.

15. The method of Claim 10 wherein the step of  
providing a catalyst support comprises providing a  
catalyst support having at least one linear  
dimension greater than one inch.



19. A system for converting shorter-chain hydrocarbons into longer-chain hydrocarbons, the system comprising:

- 5           a feed stream preparation subsystem for receiving an oxygen-containing gas, light hydrocarbons, water, and tail gas, and preparing the feed streams for conversion to synthesis gas;
- 10           a synthesis-gas subsystem for receiving feed streams of oxygen-containing gas, light hydrocarbons, and steam and preparing therefrom synthesis gas;
- 15           a synthesis subsystem for receiving synthesis gas from the synthesis-gas subsystem and for converting at least a substantial portion of the synthesis gas into longer-chain hydrocarbons through the Fischer-Tropsch reaction; and
- wherein the synthesis subsystem comprises:
- 20           a saturator unit having an inlet for receiving a circulating hydrocarbon liquid and an inlet for receiving synthesis gas, the saturator for substantially saturating a hydrocarbon liquid with synthesis gas introduced into the saturator;
- 25           a reactor fluidly coupled to the saturator unit for receiving a saturated hydrocarbon liquid therefrom; and
- 30           a stationary, structured Fischer-Tropsch catalyst disposed within the reactor for converting at least a portion of a saturated hydrocarbon liquid into longer-chain hydrocarbons.

20. A system for converting synthesis gas into longer-chain hydrocarbon products through the Fischer-Tropsch reaction, the system comprising:

a saturator unit having an inlet for receiving a circulating hydrocarbon liquid and an inlet for receiving synthesis gas, the saturator for substantially saturating a hydrocarbon liquid with synthesis gas introduced into the saturator;

a reactor fluidly coupled to the saturator unit for receiving a saturated hydrocarbon liquid therefrom; and

a stationary, structured Fischer Tropsch catalyst disposed within the reactor for converting at least a portion of a saturated hydrocarbon liquid into longer-chain hydrocarbons through a Fischer-Tropsch reaction.

21. The system of Claim 20 further comprising a heat exchanger associated with the reactor for removing heat from the reactor.

22. Method for converting synthesis gas into Fischer-Tropsch products through the Fischer-Tropsch reaction, the method comprising the steps of:

5           delivering CO and H<sub>2</sub> to a reactor having a stationary, structured Fischer-Tropsch catalyst disposed in the reactor; and

10           causing the CO and H<sub>2</sub> to flow through the reactor whereby the stationary, structured Fischer-Tropsch catalyst converts at least a portion of the CO and H<sub>2</sub> into Fischer-Tropsch products.

23. The method of Claim 22 wherein the step of delivering CO and H<sub>2</sub> to the reactor comprises the steps of: saturating a hydrocarbon liquid with synthesis gas and delivering the saturated hydrocarbon liquid to the reactor.

24. The method of Claim 22 wherein the step of delivering CO and H<sub>2</sub> to the reactor comprises the step of delivering synthesis gas to the reactor.

25. The method of Claim 22 wherein the step of delivering CO and H<sub>2</sub> to the reactor comprises the steps of: saturating a hydrocarbon liquid with synthesis gas, delivering the saturated hydrocarbon liquid to the reactor, and delivering synthesis gas to the reactor.